



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-------------------------|-------------|----------------------|---------------------|------------------|
| 10/692,446 | 10/22/2003 | Yiqing Jin | ARC-P132 | 8012 |
| 32566 | 7590 | 05/03/2007 | EXAMINER | |
| PATENT LAW GROUP LLP | | | WANG, CLAIRE X | |
| 2635 NORTH FIRST STREET | | | ART UNIT | PAPER NUMBER |
| SUITE 223 | | | 2624 | |
| SAN JOSE, CA 95134 | | | | |
| MAIL DATE | | DELIVERY MODE | | |
| 05/03/2007 | | PAPER | | |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | |
|------------------------------|-----------------|--------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 10/692,446 | JIN ET AL. |
| | Examiner | Art Unit |
| | Claire Wang | 2624 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on _____.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) 3 is/are allowed.
- 6) Claim(s) 1,2,4-8,13 and 14 is/are rejected.
- 7) Claim(s) 9-12 is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) Notice of Informal Patent Application
- 6) Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1,2,4 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Higurashi (US 6,393,162 B1) in view of Yamaguchi et al. (US 2002/0191865 A1).

As to claim 1, Higurashi teaches a method for generating a panoramic image (Col. 1, lines 4-11), comprising receiving a first image; dividing the first image (Image A, Fig. 3) into a first portion (non comparison region of Image A, Fig. 3) and a second portion (comparison region of Image A, Fig. 3); receiving a second image (Image B, Fig. 3); dividing the second image into a third portion (comparison region of Image B, Fig. 3) and a fourth portion (non comparison region of Image B, Fig. 3); matching an overlapping region between the second portion of the first image and the third portion of the second image (Col. 4, lines 29-36); stitching the second portion of the first image and the third portion of the second image to form a first stitched image (Col. 4, lines 37-40). Saving the combined image and stores it in frame memory (Col. 11, lines 47-48). Higurashi does not teach orthogonally rotating the first portion of the first image; saving the rotated first portion of the first image in a nonvolatile memory; orthogonally rotating

the first stitched image; and saving the first stitched image as part of the panoramic image in the nonvolatile memory; and orthogonally rotating the panoramic image back to an original orientation of the first and the second images and saving the panoramic image in the nonvolatile memory. Yamaguchi et al. (hereinafter "Yamaguchi") teaches of dividing up an original image into sections (Fig. 8; Paragraph 86, lines 1-3) and rotating each section (Fig. 9B; Paragraph 87 lines 7-9) to achieve a different orientation of the entire image (Fig. 9c), by saving each rotated image into appropriate place in memory (Paragraph 88, lines 1-1-4). Yamaguchi also teaches rotating images in orthogonal direction (Figs. 7A-7B). This therefore reads on the claimed saving rotated image into nonvolatile memory. Thus, it would have been obvious for one ordinarily skilled in the art at the time of invention to combine the panoramic image generator of Higurashi with the image rotator of Yamaguchi in order to achieve different orientation of an image (Fig. 9B; Paragraph 87 lines 7-9). Further, performing rotation helps to ensure that all of the image portions are in the same orientations.

As to claim 2, Higurashi teaches after said receiving a first image and prior to said dividing the first image, projecting the first image onto a cylinder to warp the first image (cylindrical conversion, Fig. 3); and after said receiving a second image and prior to said dividing the second image, projecting the second image onto the cylinder to warp the second image (cylindrical conversion, Fig. 3).

As to claim 4, Higurashi teaches wherein said matching the second portion of the first image (comparison region of Image A, Fig. 3) and the third portion of the second image (comparison region of Image B, Fig. 3) comprises matching shared features

(feature points; Col. 9, lines 65) between the second portion of the first image and a sub-portion of the third portion of the second image (Col. 9, lines 64-66).

As to claim 13, Higurashi teaches receiving a third image (Image C, Fig. 1); dividing the third image into a fifth portion and a sixth portion; matching the fourth portion of the second image and the fifth portion of the third image; stitching the fourth portion of the second image and the fifth portion of the third image to form a second stitched image; rotating the second stitched image; and saving the second stitched image in the nonvolatile memory (this is the same procedure as claims 1-2, the only difference is the use of a third image, Image C. Higurashi discloses that his image synthesizing apparatus is capable of combining multiple images using the same method mentioned in claims 1-2 (Col. 6, lines 50-55)).

3. Claims 3, 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Higurashi (US 6,393,162 B1) in view of Yamaguchi et al. (US 2002/0191865 A1) as applied to claim 4 above, and further in view of Szeliski et al. (US 6,157,747).

As to claim 5, note the discussion of Higurashi in view of Yamaguchi above. Both Higurashi and Yamaguchi do not disclose generating a first level of the second portion of the first image at a first resolution; generating a second level of the third portion of the second image at the first resolution; selecting at least a first feature on the first level of the first image; searching the second level of the second image for the first feature; and matching the first feature between the first layer of the first image and the

second layer of the second image to determine a first relative motion between the first image and the second image. Szeliski teaches of an image mosaic method that uses resolution level to match and align adjacent images to form a panoramic image (Col. 18, lines 14-19). Therefore, this reads on the claimed first level of the first image and the second level of the second image. Thus, it would have been obvious for one ordinarily skilled in the art at the time of the invention to have combined the panoramic image generator of Higurashi and the image rotator of Yamaguchi with the resolution level matcher of Szeliski in order to solve the problem of non-existing detail or the detail may be strongly aliased at coarse resolution levels (Szeliski Col. 18, lines 7-11)

Szeliski also teaches of local motion estimation between pairs of overlapping images (Col. 3, lines 66-67; Col. 4, lines 1-3). This reads on the claimed "determine a first relative motion between the first image and the second image". Therefore, it would have been obvious for one ordinarily skilled in the art at the time of the invention to have combined the panoramic image generator of Higurashi and the image rotator of Yamaguchi with the motion estimation method of Szeliski because it solves the problem of loss of detail or image ghosting from an image (Szeliski Col. 3, lines 66-67).

As to claim 6, note the discussion of Higurashi in view of Yamaguchi further in view of Szeliski above. Szeliski teaches wherein matching shared features between the second portion of the first image and a portion of the third portion of the second image further comprises: matching pixels in the second portion of the first image and the third portion of the second image based on the first relative motion between the first image and the second image (Fig. 25B; Col. 27, lines 10-15).

As to claim 7, note the discussion of Higurashi in view of Yamaguchi further in view of Szeliski above. Szeliski teaches wherein matching shared features between the second portion of the first image and a portion of the third portion of the second image further comprises: generating a third level of the second portion of the first image at a second resolution that is greater than the first resolution (coarse-to-fine process, where the use of 3 to 4 pyramid levels are used; Col. 18, lines 1-7); generating a fourth level of the third portion of the second image at the second resolution (coarse-to-fine process, where the use of 3 to 4 pyramid levels are used; Col. 18, lines 1-7); selecting at least a second feature on the third level of the first image (locating feature points; Col. 21, lines 1-6); searching an area on the fourth level of the second image for the second feature, wherein the area is selected based on the relative motion between the first image and the second image (Patch j is found based on the motion vector between images I_m , I_i and I_k ; Fig. 23); matching the second feature between the third level and the fourth level to determine a second relative motion between the first image and the second image (deghosting method computes the motion/flow between all pairs of images; Col. 25, lines 24-26); and matching pixels in the second portion of the first image and the third portion of the second image based on the second relative motion between the first image and the second image (Fig. 25B; Col. 27, lines 10-15).

Art Unit: 2624

4. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Higurashi (US 6,393,162 B1) in view of Yamaguchi et al. (US 2002/0191865 A1) as applied to claim 4 above, and further in view of Teo (US 6,385,349 B1).

As to claim 8, note the discussion of Higurashi in view of Yamaguchi above. Both Higurashi and Yamaguchi do not disclose wherein said stitching the second portion of the first image and the third portion of the second image comprises: determining a minimum color difference path in the overlapping region; filling a first side of the minimum color difference path with color values from the first image; and filling a second side of the minimum color difference path with color values from the second image. Teo teaches a method of merging the images by combining the respective pixel color values in the overlap regions (Col. 8, lines 29-31) using a technique known as "feathering". The technique feathering computes a weighted combination of pixel values of image A and image B in the overlap region (Col. 8, lines 40-47). This technique will allow minimization of deviation between the color intensities of the two images. Thus the feathering technique of Teo reads on the claimed invention. Therefore, it would have been obvious to one ordinarily skilled in the art at the time of the invention was made to have combined the feathering technique of Teo with the panoramic image generator of Higurashi and the image rotator of Yamaguchi in order to minimize the lighting difference between two images (Teo, Col. 9, lines 25-26)

Art Unit: 2624

5. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Higurashi in view of Yamaguchi as applied to claim 1 above, and further in view of Takiguchi et al. (US 7,085,435 hereinafter "Takiguchi").

As to claim 14, Higurashi and Yamaguchi do not teach saving the panoramic image in a JPEG format in the nonvolatile memory. Takiguchi teaches an image systemization method that stores the image data in JPEG format (Col. 12, lines 56-59). Thus, Takiguchi's storage format reads on the claimed JPEG format. Therefore, it would have been obvious for one ordinarily skilled in the art at the time the invention was made to combine Higurashi and Yamaguchi's panoramic image system with Takiguchi's storage format in order to allow compression of the image date.

Allowable Subject Matter

6. Claim 3 is allowed. The following is a statement of reasons for the indication of allowable subject matter: The equation that is used to generate the cylindrical projection in claim 3 is allowable.
7. Claims 9-12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

8. Applicant's arguments filed February 20th, 2007 have been fully considered but they are not persuasive.
9. In response to applicant's argument that there is no motivation to modify Higurashi with Yamaguchi et al., the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, both Higurashi and Yamaguchi are in the image analysis field. Higurashi teaches a panoramic maker that uses cylindrical conversion, but does not teach rotating the first half of the second image, combining the second half of the first image and the first half of the second image and then rotating the combined image. Yamaguchi teaches an image manipulation system where it is dividing up an original image into sections and rotating each section to achieve a different orientation of the entire image, by saving each rotated image into appropriate place in memory. It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine Higurashi's panoramic maker with Yamaguchi's rotating method so that images can be rotated in any desired manner to have the correct orientation (Yamaguchi [0087], lines 7-9).

10. In response to applicant's argument that Teo does not teach determining a minimum color difference path in the overlapping region. Examiner would like to point out that claim language is given its broadest reasonable interpretation. The specification is not a measure of invention. Therefore, limitations contained therein cannot be read into the claims for the purpose of avoiding the prior art. *Ir re Sporck*, 55 CCPA 743, 386 F. 2d 924, 155 USPQ 687 (1968). In the instant case, Teo teaches computing a weighted combination of pixel values of image A and image B in the overlap region (Col. 8, lines 40-47). This technique will allow minimization of deviation between the color intensities of the two images.

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Claire Wang whose telephone number is 571-270-1051. The examiner can normally be reached on Mid-day flex.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Mancuso can be reached on 571-272-7695. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Claire Wang
04/26/2007

JOSEPH MANCUSO
SUPERVISORY PATENT EXAMINER